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(54) Title of Invention: Display Apparatus

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Specification

1. Title of invention

Display Apparatus

2. What is claimed is:

Claim 1: A display apparatus wherein a luminescence layer is provided on a display panel, and an LED which emits ultraviolet light is arranged in the rear of the display panel.

Claim 2: The display apparatus according to Claim1, wherein the luminescence layer is formed through a transcription method.

3. Detailed explanation of the invention

[Field of industrial application]

The present invention pertains to a display apparatus having a section whose shape is not limited and which emits lights of various colors.

[Prior art technologies]

Conventionally, there have been such display apparatuses using an LED as follows.

1. A display apparatus in which a hole is provided on a display panel and an LED is engaged therein. Light emitted by the LED is directly visible.
2. A display apparatus in which an LED is arranged in the rear of a transparent

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portion of a display panel and a light blocking layers are formed on in the portions other than the light emitting section of the display panel. The light emitted by the LED is visible through the transparent portion.

[Issues to be solved by the invention]

However, conventional display apparatuses had such disadvantages as follows. Namely, in the display apparatus of 1, as many holes as the number of LEDs should be provided on the display panel. Moreover, because an LED serves as a light emitting section, the shape of the light emitting section was limited to the shape of the LED, such as rectangle or circle. Furthermore, an emitted color is just as that of an LED itself, and thus only a limited number of colors can be displayed.

Besides, because the display apparatus of 2 emits light through the transparent section of the display panel, an LED with a high light emission intensity must be employed. At the time, light leaks unless the light is sufficiently blocked by the light blocking layer, and the shape of the light emitting section may be unclear. The light blocking layer is typically formed through a printing method, however, the thickness of the light blocking layer formed through a printing method is thin. Therefore, it is difficult to obtain satisfactory light blocking properties. In addition,

the capability of the display apparatus of 2 is also limited to displaying the number of colors limited to the colors of LEDs themselves.

The purpose of the present invention is to provide a display apparatus which solves issues such as mentioned above, the shape of whose light emitting section is not limited, and which is capable of emitting lights of various colors.

[Means to solve the issues]

In order to accomplish the above stated purpose, in the present invention a display apparatus is constituted in such a fashion that a luminescence layer is provided on a display panel and an LED which emits ultraviolet light is arranged in the rear of the display panel.

The present invention is explained further in detail in reference to a figure.

Figure 1 is a cross-sectional view which illustrates an example of the display apparatus of the present invention. Numerical references 1, 2, 3 and 4 indicate a display panel, a luminescence layer, a light blocking payer and an LED respectively.

On display panel 1, luminescence layer 2 is formed. The shape of display panel 1 is not limited to a simple plate shape but it can be of an arbitrary shape such as

a plastic mold. Luminescence layer 2 can be formed on either side of display panel 1. In the case in which luminescence layer 2 is formed on the front surface side of display panel 1, display panel 1 must be formed with a material which transmits ultraviolet light emitted by LED 4. Moreover, in the case in which luminescence layer 2 is formed on the back surface of display panel 1, display panel 1 must be formed of a material which transmits the light emitted by luminescence layer 2. For instance, when luminescence layer 2 is formed on the back surface side, one can employ acrylic resin, AS resin, vinyl chloride and so forth as a material of display panel 1.

Luminescence layer 2 becomes a light emitting section which emits fluorescence or phosphorescence when it is irradiated with ultraviolet light. Luminescence layer 2 can be formed in an arbitrary shape on the front or back surface side of display panel 1 through a printing method and so forth. Further, if one desires to form light blocking layer 3 or a pattern layer on display panel 1 in addition to luminescence layer 2, such a layer may be formed through a transcription method at the

same time when luminescence layer 2 is formed.

On the back surface of display panel 1 where luminescence layer 2 is formed in such a manner, LED 4 is arranged. Unlike an ordinary LED, LED 4 which is employed here emits ultraviolet light. As LED 4 which emits ultraviolet light, the one which emits light having a wavelength region of 400nm or less is used. For example, the ones utilizing GaN or ZnS which are group III-IV compounds in the periodic table as a semiconductor material may be employed.

[Effects]

LED 4 is arranged in the rear of display panel 1 where luminescence layer 2 is formed thereupon. Ultraviolet light is irradiated on luminescence layer 2 and thereby light is emitted by luminescence layer 2. Luminescence layer 2 can be formed in an arbitrary shape. Furthermore, one can adopt luminescence layer 2 which emits lights of various colors.

[Advantages of the invention]

The display apparatus of the present invention makes a luminescence layer emits light with an

LED which emits ultraviolet light. Therefore, through forming the luminescence layer which is a light emitting section with an arbitrary pattern, a light emitting section of an arbitrary shape can be formed.

Furthermore, the luminescence layer determines the color of light emission. Hence, unlike in the case in which an LED alone emits light, the light emitting section can be of an arbitrary color.

4. Brief Explanation of Figures

Figure 1 is a cross-sectional view which shows an example of the display apparatus of the present invention.

1: Display plate, 2: Luminescence layer, 3: Light blocking layer and 4: LED.

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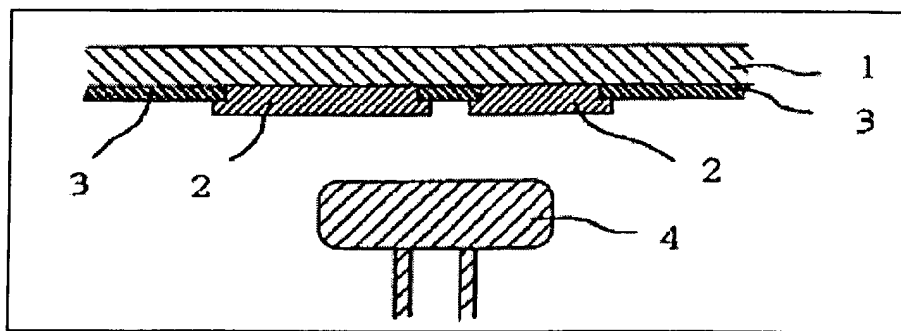


Figure 1

- 1: Display plate
- 2: Luminescence layer
- 3: Light blocking layer
- 4: LED

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